

Mathematics Test Explanations

- The correct answer is D.** You are given that Rachel paid a total of \$103 for her speeding ticket, and that the basic fine for speeding is \$25. This means that Rachel was charged an additional \$78 ($103 - 25$). If the charge for each mile per hour over the speed limit is \$6, then Rachel was driving 13 mph over the 55-mph speed limit ($78/6 = 13$), or 68 mph.
- The correct answer is J.** To find the equivalent expression, multiply the constants ($5 \times 2 \times 3$), combine the x terms ($(x^3)(x)(x) = x^{3+1+1} = x^5$ (because when you have a common base you keep the base and add the exponents), and combine the y terms ($(y^1)(y^2) = y^{1+2}$, or y^3). The result is $30x^5y^3$.
- The correct answer is C.** To solve, determine the pattern in the arithmetic sequence 13, 10, 7, ... The second term, 10, is 3 less than the first term, 13. Likewise, the third term, 7, is three less than the second term, 10. Therefore, the fourth term will be three less than the third term, 7, making it $7 - 3 = 4$.
- The correct answer is H.** The product of two numbers is found by multiplying them ($r \times s$ in this case). Raising the product of r and s to the fourth power is represented by $(r \times s)^4$, since you are raising the entire product to the fourth power. Remember that $r \times s$ is equivalent to rs .
- The correct answer is D.** To solve this problem, you must remember that if you start at the decimal point and count to the right, the place values are tenths, hundredths, thousandths, ten-thousandths, and so on. Therefore, the decimal 0.005 has the digit 5 in the thousandths place.
- The correct answer is J.** To solve this problem, write an equation for the price of all of the notebooks and then solve for the price of one notebook. Make N the price of notebooks and B the price of binders purchased by Mandy and Jordan. If Mandy paid \$5.85 for 3 notebooks and 1 binder, the result is $3N + B = 5.85$. Likewise for Jordan, \$4.65 for 2 notebooks and 1 binder can be represented in the equation $2N + B = 4.65$.

Use substitution to solve these equations. Solving Jordan's equation for B yields $B = 4.65 - 2N$. If you substitute $4.65 - 2N$ as B into Mandy's equation, the result is $3N + (4.65 - 2N) = 5.85$. Combining like terms yields $N + 4.65 = 5.85$. If you subtract 4.65 from both sides of the equation, you find that $N = 1.20$. Therefore, the price of one notebook is \$1.20.

- The correct answer is E.** You are given that $mn = k$ and $k = x^2n$. To solve this problem, first combine the equations into $mn = x^2n$. Then, divide both sides by n to get $m = x^2$.
- The correct answer is F.** To solve for x in the equation $7x + 5 = 2x + 9$, you could subtract $2x$ and 5 from both sides of the equation. That results in the equation $5x = 4$. Dividing both sides by 5, the result is $x = \frac{4}{5}$.
- The correct answer is D.** To find what percent of 5 the number 7 is, you can simply divide 7 by 5 and multiply by 100%, as follows:

$$7/5 = 1.4$$

$$(1.4)(100) = 140\%$$

Because 7 is greater than 5, you could have eliminated answer choices A, B, and C.

- The correct answer is H.** To find what $x^3 + x$ equals, you need to first solve $x^2 = 16$ for x . The solution is the square root of 16, which is 4. Then substituting into the original expression, you get $4^3 + \sqrt{4}$. This expression simplifies to $64 + 2$, or 66.
- The correct answer is B.** This question is testing your knowledge of absolute value. The absolute value of -16 is 16. Notice that you must take the negative of the absolute value, or -16 . You must then add -16 to 16, which results in 0.
- The correct answer is K.** The probability that the card chosen will be red when there are 6 spades, 3 hearts, and 7 diamonds, is the number of favorable outcomes divided by the number of total outcomes. The number of favorable outcomes is 10 because there are 3 hearts and 7 diamonds, which constitute the "red" cards. The total number of outcomes is $6 + 3 + 7 = 16$. Thus the probability of the card being "red" is $\frac{10}{16}$, or $\frac{5}{8}$ when reduced.
- The correct answer is D.** To find a simplified form of $4x - 4y + 3x$, combine like terms (all of the x 's and all of the y 's) to get $7x - 4y$. Notice that you cannot subtract $4y$ from $4x$ because the variables are different.
- The correct answer is H.** To solve this problem, realize that the number of pets that Gary has is determined through relationships between the quantities of the different types of pets: turtles (t), cats (c), and birds (b). Because the number of birds,

b , is 4 more than the number of turtles, t , this can be expressed as $b = t + 4$. Also, since the number of cats, c , is 2 times the number of birds, this can be expressed as $c = 2b$. You might wish to use a table to show the numerical relationship between the numbers of each pet and the total number of pets, using the answer choices as a guideline:

Number of turtles (t)	0	1	2	3	4
Number of birds ($b = t + 4$)	4	5	6	7	8
Number of cats ($c = 2b$)	8	10	12	14	16
TOTAL	12	16	20	24	28

According to this matrix, Gary *could* have a total of 20 pets, but he could not have a total of 14, 18, 22, or 26 pets.

- 15. The correct answer is D.** To solve this equation, first calculate how many $1/4$ -inch segments there will be. Dividing 66 by 12, you can see that there will be 5.5 $1/4$ -inch segments. Thus, the road's length in inches will be $1/4 + 1/4 + 1/4 + 1/4 + 1/4 + 1/8 = 1\ 1/4 + 1/8 = 1\ 3/8$.

- 16. The correct answer is F.** To find $(a - b)^3$ given $b = a - 4$, you could solve the equation for $a - b$. By subtracting b and -4 from both sides, you get $4 = a - b$. Substituting 4 for $a - b$ in $(a - b)^3$ yields $(4)^3$, or 64.

If you got stuck on this one, you could try choosing a specific value for a , such as 2. Then $b = -2$ and $(a - b)^3 = (2 + 2)^3 = 4^3$, or 64.

- 17. The correct answer is D.** To solve this problem, you should realize that if g is an integer, $\sqrt{g^2}$ would also be an integer. Of the answer choices, only $\sqrt{8}$ is not an integer; in fact, it is an irrational number.
- 18. The correct answer is H.** To find the number of distinct outfits that Justin can make from 6 different dress shirts, 3 different pairs of pants, and 5 different ties, multiply the numbers of the three different components together. Thus there are $(6)(3)(5)$, or 90 distinct outfits that Justin can make.
- 19. The correct answer is D.** To find the number of barrels of gasoline that can be produced from 3,500 barrels of crude oil when, for every 10,000 barrels of crude oil supplied the refinery can produce 6,500 barrels of gasoline, you can set up a proportion with ratios of barrels of gasoline to barrels of crude

oil: $\frac{6,500}{10,000} = \frac{\text{barrels gasoline}}{3,500}$, resulting in 2,275 barrels of gasoline produced.

- 20. The correct answer is H.** To solve this problem, recall that the formula for finding the slope of a line between the two points (x_1, y_1) and (x_2, y_2) is $(y_2 - y_1)/(x_2 - x_1)$. Also recall that the origin lies at point $(0,0)$. Therefore, the points are $(-6,2)$ and $(0,0)$. You can use either set of points as (x_1, x_2) and (y_1, y_2) , as long as you use them consistently within the formula, as follows:

$$(2 - 0)/(-6 - 0) = 2/-6 = -1/3$$

- 21. The correct answer is D.** To solve this problem, remember that, when multiplying the same base number raised to any power, add the exponents. Thus, if $n^x \cdot n^8 = n^{24}$, $x + 8 = 24$, and x equals 16. Also, remember that, when raising an exponential expression to a power, multiply the exponent and power. So in $(n^6)^y = n^{18}$, $6y = 18$, and $y = 3$. Therefore, $x + y = 16 + 3$, or 19.

- 22. The correct answer is J.** To find the slope-intercept form of the equation $9x + 3y - 6 = 0$, you could first add 6 and subtract $9x$ from both sides of the equation to get $3y = -9x + 6$. Then, multiply both sides by $\frac{1}{3}$ to get $y = -3x + 2$.

- 23. The correct answer is A.** To solve this problem, remember that the volume of a cube is equal to $(\text{length})(\text{width})(\text{height})$ or simply $(\text{side})^3$, since all sides of a cube are equivalent in length. To find the length of one side, find the cube root of 64, which is 4 ($4^3 = 64$). Because all sides of a cube are equal, the shortest distance from the center of the cube to the base of the cube will equal the midpoint of the length of the cube, which is $4/2$, or 2.

- 24. The correct answer is F.** The sine (sin) of an acute angle in a right triangle is equivalent to the length of the side opposite the angle over the length of the hypotenuse $\left(\frac{\text{opp}}{\text{hyp}}\right)$. To find $\sin C$ in $\triangle ABC$, take the length of the opposite side over the length of the hypotenuse, or $\frac{a}{b}$.

Answer choice G is the tangent $\left(\frac{\text{opp}}{\text{adj}}\right)$, H is the cosecant $\left(\frac{\text{hyp}}{\text{opp}}\right)$, J is the cosine $\left(\frac{\text{adj}}{\text{hyp}}\right)$, and K is the cotangent $\left(\frac{\text{adj}}{\text{hyp}}\right)$. If you did not get the correct answer, it would be wise to review trigonometric ratios in a right triangle.

- 25. The correct answer is C.** To solve this problem, remember that the area of a triangle is calculated using the formula $A = 1/2(bh)$, where b is the base of the triangle and h is the height of the triangle. The base of the triangle extends from the origin in the (x, y) coordinate plane, $(0, 0)$ to the point $(5, 0)$. This means that the base is 5. The height of the triangle extends from the origin in the (x, y) coordinate plane, $(0, 0)$ to $(0, 4)$. The height of the triangle is 4. Substitute these values into the formula and solve:

$$A = 1/2(bh)$$

$$A = 1/2(5 \times 4)$$

$$A = 1/2(20)$$

$$A = 10$$

- 26. The correct answer is H.** To solve this problem, recognize that the \$39 price of the sneakers is 30 percent *more than* the amount it costs the store to purchase one pair of the sneakers. This can be represented as 130%, or 1.3. Thus, the price that the store pays for the sneakers is $\$39/1.3$, or \$30. At the end of the year sales associates get 20% off of this \$30 price, therefore paying 80% of the price the shoe store pays. The cost to the employees is $\$30 \times 0.80$, or \$24.

- 27. The correct answer is D.** To find the uniform depth, you would substitute in the formula for volume, V , of a rectangular prism with the height h , length l , and width w , which is $V = lwh$. After substituting you should have $7,000 = 30(64)(h)$, or $7,000 = 1,920h$. Thus $h = \frac{7,000}{1,920}$, or about 3.65, which is between 3 and 4.

- 28. The correct answer is G.** To find the length of the segment AC in $\triangle ABC$, where the length of the hypotenuse is 17, and the cosine of $\angle C$ is $\frac{3}{5}$, use the definition of cosine: the ratio of the lengths of the adjacent side to the length of the hypotenuse. In $\triangle ABC$ cosine of $\angle C$ is the ratio of the segment AC to the length of the hypotenuse. After substituting the length of the hypotenuse, we get $\frac{3}{5} = \frac{AC}{17}$, and $AC = \frac{(17 \times 3)}{5}$, or 10.2 feet.

- 29. The correct answer is A.** The number of people in the choir is 1 short from being able to be divided evenly by both 5 and 6. To find the least possible number of people in the choir, take one less than the lowest number for which 5 and 6 are both

factors. The lowest number for which 5 and 6 are both factors is 30. Thus, the least possible number of people in the choir is $30 - 1 = 29$.

- 30. The correct answer is G.** To find the y -coordinate where the 2 lines $y = \frac{x}{2} + 3$ and $y = 3x - 2$ intersect, you could set $\frac{x}{2} + 3$ equal to $3x - 2$ because they are both already solved for y . Where they would intersect, their y -coordinates would be equal. To solve $\frac{x}{2} + 3 = 3x - 2$, you could add 2 and subtract $\frac{x}{2}$ to both sides to get $\frac{5x}{2} = 5$, then multiply by $\frac{2}{5}$ (the reciprocal of $\frac{5}{2}$) to get $x = 2$. Then simply substitute 2 for x into either of the initial equations to get $y = 4$.

- 31. The correct answer is B.** To find the length BC when the length AD is 32 units, the length AC is 23 units, and the length BD is 27 units, and the points are along the segment AD as shown in the problem, you must notice that segment BC is the intersection of segment AC and the segment BD . So, the sum of the lengths AC and BD is the same as the sum of the lengths AD and BC . Using the actual lengths, solve for BC as follows:

$$AC + BD = AD + BC$$

$$23 + 27 = 32 + BC$$

$$50 = 32 + BC$$

$$18 = BC$$

- 32. The correct answer is J.** To solve the equation $M = 6T + 5$ for N you could subtract 5 from both sides to get $M - 5 = 6N$, and then divide by 6 on both sides to get $\frac{(M - 5)}{6}$.

- 33. The correct answer is B.** To solve this problem, recognize that the triangle is a "special triangle." A right triangle in which the length of the longer leg is $\sqrt{3}$ times the length of the shorter leg is a $30^\circ - 60^\circ - 90^\circ$ right triangle. Another property of this type of right triangle is that the hypotenuse is 2 times the length of the shorter leg. So, this right triangle has lengths x , $x\sqrt{3}$, and $2x$. The perimeter is the sum of the lengths of the sides. You are given that the perimeter equals $12 + 4\sqrt{3}$. Set the two equations equal and solve for x :

$$12 + 4\sqrt{3} = x + x\sqrt{3} + 2x$$

$$12 + 4\sqrt{3} = 3x + x\sqrt{3}$$

For the right side of the equation to equal the left side of the equation, x must be equal to 4.

- 34. The correct answer is G.** To solve this problem, first recognize that, since $\overline{XY} = \overline{YZ}$, the triangle is isosceles. Because the triangle is isosceles, you know that angles X and Z are congruent and have equal measure. If $a = 40^\circ$, then $180^\circ = 40^\circ + x^\circ + y^\circ$ and $x^\circ + y^\circ = 140^\circ$. Since $x = y$, both angles equal 70° . In triangles, sides have lengths that are proportional to their opposite angles. Because you know that the length of \overline{XZ} is 5, and \overline{XZ} is opposite the 40° angle, you can set up a proportion to find the length of side \overline{XY} using its opposite angle, 70° , as follows:

$$\begin{aligned} 5/40 &= \overline{XY}/70 \\ 5 &= 40(\overline{XY}/70) \\ (5 \times 70) &= 40\overline{XY} \\ &= 350/40 = 8.75 \end{aligned}$$

- 35. The correct answer is B.** To find the y -intercept of the line $-9x - 3y = 15$, convert the equation to slope-intercept form. To do so, first add $9x$ to both sides to get $-3y = 9x + 15$. Then divide by -3 to get $y = -3x - 5$. Since the slope-intercept form of the equation is $y = -3x - 5$, the slope is -3 and the y -intercept is -5 .
- 36. The correct answer is F.** For the product of two integers to lie between 137 and 149, a multiple of both integers must lie between 137 and 149. Of the answer choices, 15 is the only number without a multiple that lies between 137 and 149; $15 \times 9 = 135$, and $15 \times 10 = 150$. Thus, the only number that cannot be one of the integers is 15.
- 37. The correct answer is A.** You are given that x divided by 7 leaves a remainder of 4. The easiest approach to this problem is to assume that 7 goes into x one time, with a remainder of 4. Therefore, x is equal to 11. If $x = 11$, then $2x = 22$. When 22 is divided by 7, the remainder is 1.
- 38. The correct answer is G.** Recall that the area of a circle with radius r is πr^2 . The radius of the circle can be found by taking half of the distance across the circle, which in this case is also equal to half of the length of the side of the square. Thus the area of the square is $\pi 6^2 =$ about 113 square feet. If you selected answer choice A you found the area of the square.
- 39. The correct answer is E.** You can apply common sense to solve this problem. If the average of
- 7 consecutive integers is 16, it would make sense that the middle number is 16 (this assumption only holds because there are an odd number of integers and because the integers are consecutive). Thus, the list of consecutive integers is 13, 14, 15, 16, 17, 18, 19. The sum of the first and last integers is $13 + 19 = 32$.
- 40. The correct answer is G.** To find the measure of $\angle BDC$ in the figure, it is helpful to recognize that the sides BC and AD are parallel (definition of trapezoid) and are connected by the transversal BD . $\angle CBD$ and $\angle ADB$ are alternate interior angles, and thus are equal and both measure 25° . Because A , D , and E all lie along the same line, $\angle ADE = 180^\circ$. Because $\angle ADE$ is made up of $\angle ADB$, $\angle BDC$, and $\angle CDE$, you know that the measures of these three angles add up to 180° . If x is the unknown angle measure, then $25^\circ + x + 125^\circ = 180^\circ$; thus x is equal to 30° .
- 41. The correct answer is D.** To solve this problem, first eliminate answer choices that yield equal values for $f(-5)$ and $f(5)$. These include answer choices in which the functions have even powers of x such as answer choice A, where $f(x) = 6x^2$, answer choice B, where $f(x) = 6$, and answer choice E, where $f(x) = x^6 + 6$. Now, substitute -5 and 5 into the remaining answer choices:
- Answer choice C:** $f(x) = 6/x$. When x is -5 , $f(x) = -6/5$, and when x is 5 , $f(x) = 6/5$. Therefore, $f(5)$ is greater than $f(-5)$ and answer choice C is incorrect.
- Answer choice D:** $f(x) = 6 - x^3$. When $x = -5$, $f(x) = 6 - (-125)$ or 131 , and when x is 5 , $f(x) = 6 - 125$, or -116 . Therefore, $f(-5)$ is greater than $f(5)$.
- 42. The correct answer is H.** Systems of equations have an infinite number of solutions when the equations are equivalent. In order for the two equations to be equivalent, the constants and coefficients must be proportional. If the entire equation $3a + b = 12$ is multiplied by 4, the result is $4(3a + b) = 4(12)$, or $12a + 4b = 48$. Thus in order for the two equations to be equivalent, $3n = 48$, or $n = 16$.
- 43. The correct answer is E.** You could take a “brute-force” approach and test all the given values of y and see if you could find an x that worked. For example, if $y = 9$, then the two numbers are $x^2 \times 9^2$ and $x \times 9^3$. You can see that 9^2 is a factor of these 2 numbers, so 27 cannot be the greatest common factor.
- It might be more efficient to be more general and avoid testing all 5 values of x . Notice that xy^2

is a common factor of both x^2y^2 and xy^3 . Because it is a factor, xy^2 must also be a factor of 27. Well, 27 factors as 3×3^2 , so it seems natural to see if $x = 3$ and $y = 3$ are possible solutions. In this case the two numbers from the problem are $3^2 \times 3^2$ and $3^3 \times 3$ and the greatest common factor is $3 \times 3^2 = 27$, so it works.

- 44. The correct answer is J.** To solve this problem, make x the smallest possible integer for which 15% of x is greater than 2.3. Then, set up the following inequality: $0.15x > 2.3$. Divide both sides by 0.15 to get $x > 15.333$, repeating. The smallest integer greater than the repeating decimal 15.333 is 16.

- 45. The correct answer is D.** To find the distance between 2 points in the standard (x, y) coordinate plane you can use the distance formula $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$. Calculate the distance as follows:

$$\sqrt{[(4 - 1)^2 + (4 - 0)^2]} = \sqrt{(3^2 + 4^2)} = \sqrt{25} = 5.$$

- 46. The correct answer is G.** A triangle with sides 9, 12, and 15 centimeters long has sides in the ratio of 9:12:15, which simplifies to 3:4:5. Recall that a 3-4-5 triangle is a special case because it is known to be a right triangle. Any triangle with sides in the same ratio is also a right triangle. Thus, there is a right angle between the smaller sides.

- 47. The correct answer is D.** The sum of the interior angles of a pentagon is $(5 - 2)(180^\circ)$, or 540° . Thus, the total of the other 4 angles is $540^\circ - 40^\circ$, or 500° .

- 48. The correct answer is H.** To solve this problem, it might be helpful to use test values for r and s and systematically try the scenario presented in each answer choice. The equation $|r - s| = |r + s|$ is true only when $r = 0$ or $s = 0$.

- 49. The correct answer is A.** Logarithms are used to indicate exponents of certain numbers called bases. By definition, $\log_a b = c$, if $a^c = b$. To solve, let $\log_4 64 = x$; therefore, $64 = 4^x$. Because $4^3 = 64$, $x = 3$.

- 50. The correct answer is F.** To solve, write out every possible three-digit integer: 345, 354, 435, 453, 534, and 543; six different positive three-digit numbers can be formed, answer choice F.

- 51. The correct answer is A.** To find the real numbers x such that $x - 3 < x - 5$, you could subtract x from both sides. The result is $-3 < -5$, and because

that inequality is never true, there is no solution for x . The solution set is the empty set. If you chose an incorrect answer you might have thought that a negative value for x might reverse the inequality, which is not the case.

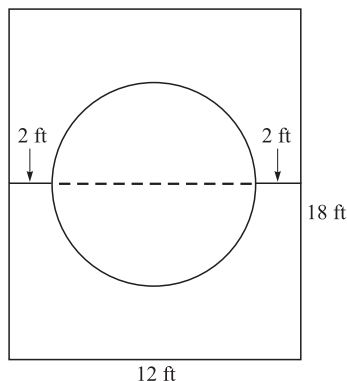
- 52. The correct answer is K.** Perpendicular lines have slopes that are opposite reciprocals. To find the slope of a line perpendicular to $7x + 4y = 11$, first find the slope by converting the equation to slope-intercept form, then take the opposite reciprocal. To do so, first subtract from both sides to get $4y = -7x + 11$. Next, divide both sides by 4 to get $y = -\frac{7x}{4} + \frac{11}{4}$. Since the slope in this line is $-\frac{7}{4}$, the slope of a line perpendicular to that is $\frac{4}{7}$.

- 53. The correct answer is B.** For the sake of simplicity, let every element in the original set have the value x . If each element in the set is multiplied by 3, and then reduced by 4, each element then has the value $3x - 4$. In a set where each value is $3x - 4$, the mean is $3x - 4$.

- 54. The correct answer is G.** One way to find $\tan \theta$ given that $\cos \theta = -\frac{3}{5}$ and $\frac{\pi}{2} < \theta < \pi$, is to first find $\sin \theta$, then find $\frac{\sin \theta}{\cos \theta}$ (which is equivalent to $\tan \theta$). To find $\sin \theta$, use the identity $\sin^2 \theta + \cos^2 \theta = 1$ and the fact that $\sin \theta > 1$ in Quadrant II ($\frac{\pi}{2} < \theta < \pi$ would place the angle in Quadrant II). Substituting you get $\sin^2 \theta + \left(-\frac{3}{5}\right)^2 = 1$, or $\sin^2 \theta + \frac{9}{25} = 1$. After subtracting $\frac{9}{25}$, you get $\sin^2 \theta = \frac{16}{25}$. After taking the square root of both sides, you get $\sin \theta = \pm \frac{4}{5}$. Because $\sin \theta > 1$ in Quadrant II, $\sin \theta = \frac{4}{5}$. Substituting into $\frac{\sin \theta}{\cos \theta}$ gives you $\frac{(4/5)}{(-3/5)}$, which equals $-\frac{4}{3}$.

Another way you could solve this problem would be to construct a right triangle with leg 3 and hypotenuse 5. By virtue of the Pythagorean Theorem, the missing side of the right triangle is 4 units long. From this triangle, knowing that $\text{tangent} = \frac{\text{opposite}}{\text{adjacent}}$, you can get $\tan \theta = \frac{4}{3}$. Then by using the fact that $\frac{\pi}{2} < \theta < \pi$, you could infer that $\tan \theta$ was negative.

- 55. The correct answer is E.** First, draw the picture of the circular pool according to the information given in the problem, where the distance from the edge of the pool to the edge of the long side of the rectangular region is 2 feet. The distance from the edge of the pool to the edge of the short side of the rectangular region can be anything greater than 2, but it is not necessary to know this distance to solve the problem:



Now you can determine the diameter of the circular pool. The diameter is the maximum distance from one point on a circle to another (the dashed line). Since the short side of the rectangular region is 12 feet, and the distance from the edge of the circular pool to each edge of the long sides of the rectangular region is set at 2 feet, the diameter of the circle must be 12 feet $- 2(2 \text{ feet})$, or 12 feet $- 4 \text{ feet}$, or 8 feet. The question asks for the radius of the pool, which is $\frac{1}{2}$ of the diameter, or 4.

- 56. The correct answer is J.** According to the problem, Kate traveled distance d in m minutes on the way to her grandmother's house, and she traveled distance d in $\frac{1}{2}m$ minutes (because she went twice as fast, it took her half as long) on the way back. The total number of minutes traveled would be equal to the number of minutes Kate traveled to her grandmother's house and back:

$$\begin{aligned} & 1m + \frac{1m}{2} \\ &= \frac{2m}{2} + \frac{1m}{2} \\ &= \frac{3m}{2} \end{aligned}$$

- 57. The correct answer is C.** To solve this problem, replace the a and b in $3a + 2b - 7$ with $a + 2$ and $b - 1$. The result is $3(a + 2) + 2(b - 1) - 7$. Distribute to get $3a + 6 + 2b - 2 - 7 = 3a + 2b - 3$. Comparing $3a + 2b - 7$ and $3a + 2b - 3$, it is apparent that the value of n increases by 4 if the value of a increases by 2 and the value of b decreases by 1.

- 58. The correct answer is F.** To solve, use the Pythagorean Theorem. The hypotenuse, c , is related to the legs x and $3x$ by the equation $c^2 = x^2 + (3x)^2$, which is equivalent to $x^2 + 9x^2$, or $10x^2$. Since $c^2 = 10x^2$, $c = \sqrt{10x^2}$, or $\sqrt{10}x$.

- 59. The correct answer is B.** Let the length of the edge of the smaller cube be s . The surface area is then $6s^2$. If the length of the edges are tripled, then s is replaced by $3s$, making the surface area $6(3s)^2 = (9)6s^2$, or 9 times larger than the initial surface area.

- 60. The correct answer is J.** The first step in solving this problem is to rewrite the information in mathematical terms, as follows:

$$\begin{aligned} a + b \text{ is at most } 9 & \text{ means that } a + b \leq 9 \\ a \text{ is at least } 2 & \text{ means that } a \geq 2 \\ b \text{ is at least } -2 & \text{ means that } b \geq -2 \end{aligned}$$

Given the information above, the value of $b - a$ will be least when b is at its minimum value of -2 . In that case, since $a + b \leq 9$, then $a + (-2) \leq 9$, and $a \leq 11$. Therefore, at its minimum, $b - a$ is equivalent to $-2 - 11$, or -13 .

Reading Test Explanations

PASSAGE I

1. **The best answer is B.** The passage states that the narrator's (Tom's) feelings about life in the North were "strengthened by Aunt Chloe, who said, "there wasn't no gentlemen in the North no way." Also, when confronted by his father, who asked him where he had heard such inaccurate things about the North, Tom replied, "'Aunt Chloe, sir; she told me.'" This best supports answer choice B.
2. **The best answer is H.** The author says that if the name of a new pupil struck Tom favorably, he would, in turn, shake the student's hand *cordially*. This has pleasant connotations since, again, Tom only cordially shook the hands of those whose names he saw favorably. Answer choices F, G, and J can be eliminated since they all have negative connotations. Answer choice H, "sincerely," makes the most sense in the context of the passage.
3. **The best answer is A.** In the first paragraph, the narrator describes himself as "a real human boy, such as you may meet anywhere in New England." This implies that he is the same as any other boy found in New England at the time; therefore, he was neither better nor worse behaved than other boys his age. This supports answer choice A.
4. **The best answer is H.** In the second paragraph, the narrator describes meeting new classmates. He states "such names as Higgins, Wiggins, and Spriggins were offensive affronts to my ear," while the names "Langdon, Wallace, Blake, and the like, were passwords to my confidence and esteem." Therefore, Blake and Wallace would be acceptable to him, but Higgins would not be acceptable.
5. **The best answer is B.** When first told by his father that he was going back to school in Rivermouth, Tom resolved that he "would not be taken away to live among a lot of Yankees!" Also, later in the passage he reports feeling "terror at the bare thought of being transported to Rivermouth to school." However, after his father talks to him about how life really was in the North, Tom "was no longer unwilling to go North." This best supports answer choice B.
6. **The best answer is F.** Tom's father shows his patience and understanding through the manner in which he handles Tom's ridiculous misconceptions about moving North. The passage states that Tom's father asked him "calmly"

about who told him such silly stories, and that his father "devoted that evening and several subsequent evenings" to explaining to Tom the true history and present happenings of life in Northern states.

7. **The best answer is B.** In the second paragraph, the narrator states that he "was born in Rivermouth almost fifty years ago." Answer choice A may appear to be correct, but the narrator is telling a story from his adult perspective about his boyhood.
8. **The best answer is H.** In the sixth paragraph, the narrator describes kicking Sam upon finding out that his father wanted to move the narrator back to Rivermouth. In the last sentence of the sixth paragraph, the narrator states "as for kicking little Sam, I always did that . . . when anything went wrong with me." The author takes out his negative feelings on Sam by kicking him and thereby abusing him, answer choice H.
9. **The best answer is D.** The narrator states in the second paragraph that he was born in New England but moved to New Orleans when just an infant. In the next paragraph he states, "I had no recollection of New England: my earliest memories were connected with the South;" and that even though he was born a Yankee, "hoped nobody would find it out," indicating that he adapted to a Southern lifestyle to the point that his Northern heritage was not obvious to anyone else.
10. **The best answer is J.** In the first paragraph the narrator states that he was an "amiable, impulsive lad," meaning that he was friendly, yet fickle. The second paragraph details an example of his amicability—he was eager to introduce himself to new students on the playground—and also his fickleness—if the boy had the wrong last name, Tom was not interested in being his friend anymore.

PASSAGE II

11. **The best answer is A.** The author uses strong language throughout the piece; for example, saying there is "no more important" and "no more difficult" knowledge than that of the self, and that a consequence of a nation not understanding its own being will result in "decay and death." Since *impassioned* means "with strong feeling," answer choice A is best.
12. **The best answer is H.** The passage states that it is important for a nation "to know itself,